Data Discernment: How to Avoid Data Fake News!

Rick Little, Performance Measures Director
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September 7-8, 2017

PRESENT: BUILDING ON SUCCESS 2017

BREAKTHROUGH RESULTS FOR GOVERNMENT AND BUSINESS

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Fake News can be entertaining …

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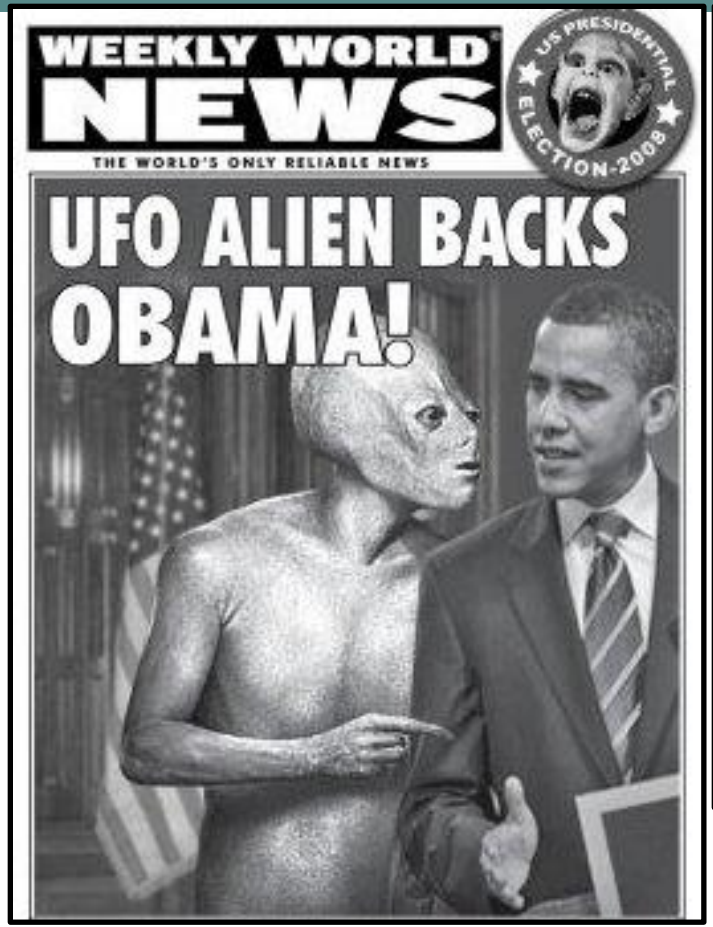
… and obvious.



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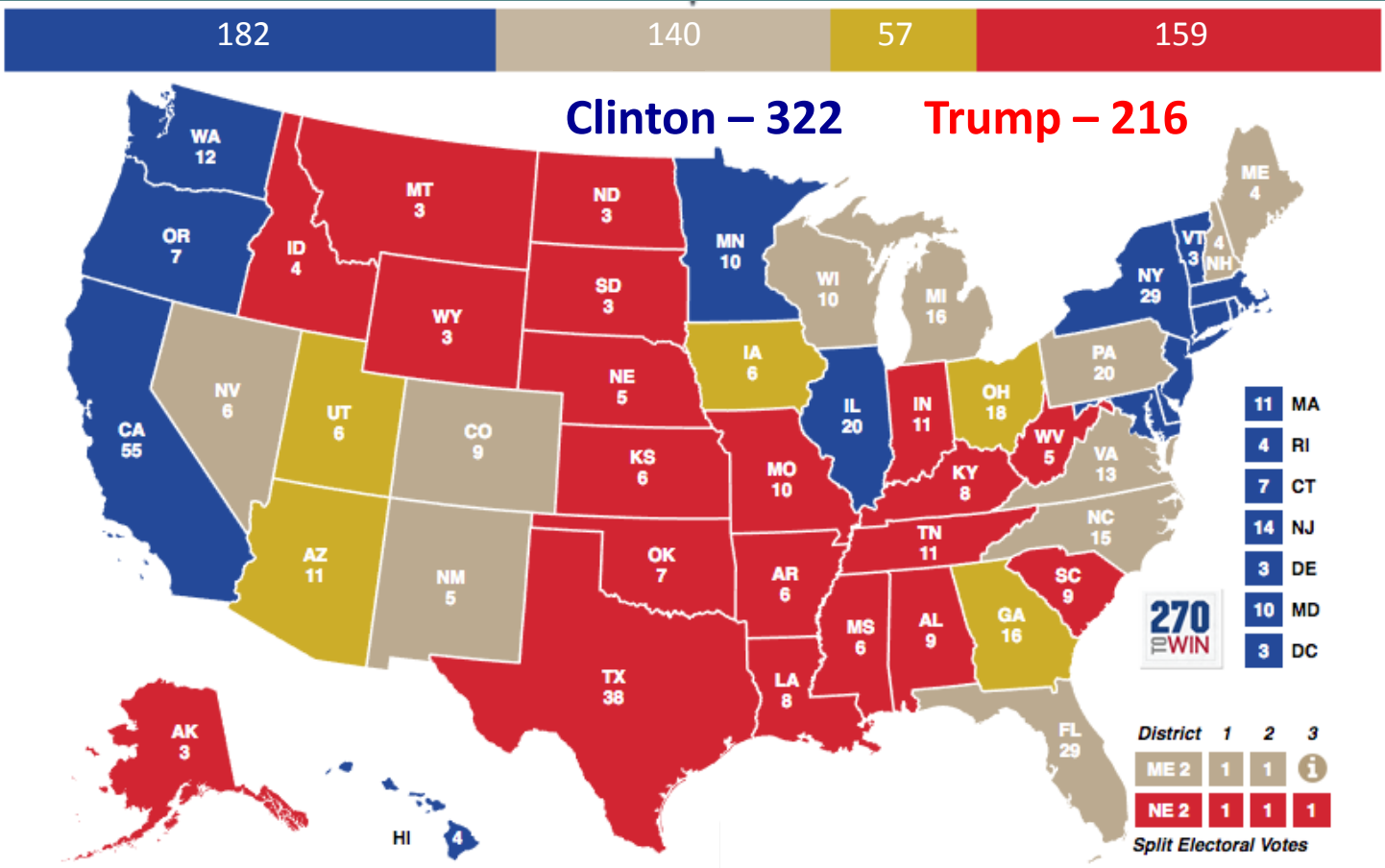
Fake News can be the product of a mistake …

Fake News can be the product of a mistake …

The day before the 2016 US Presidential Election, most pollsters and statistical models had pegged Hillary Clinton's chances of winning at greater than 90%.

99%	98%	92%	91%	89%	85%	72%
Princeton Election Consortium	Huffington Post	Daily KOS	CNN	PredictWise	New York Times	Five Thirty Eight

Illustration



Watch these states:

Lean Republican:

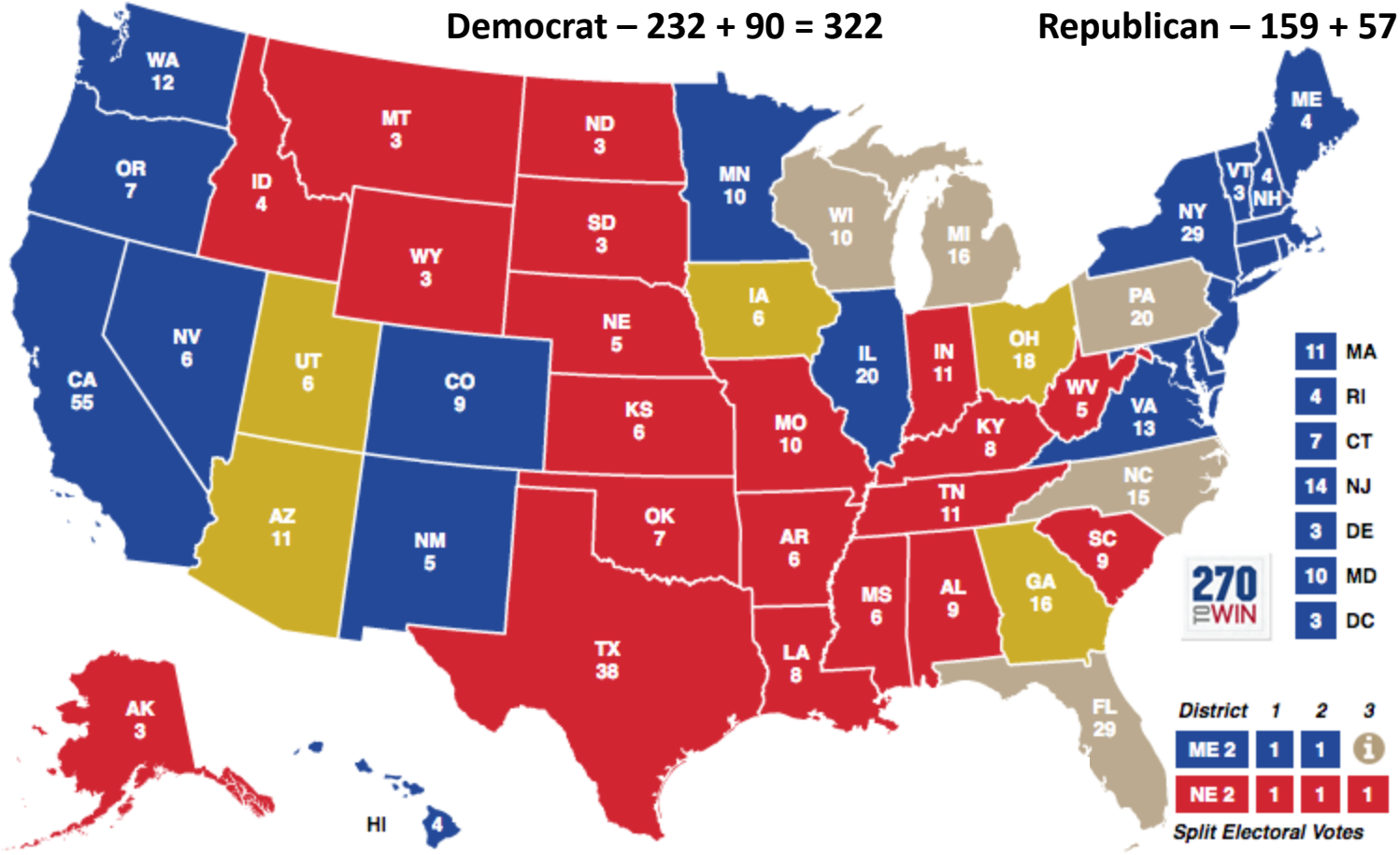
- Ohio
- Georgia
- Iowa
- Arizona
- Utah

Lean Democrat:

- Florida
- Pennsylvania
- Wisconsin
- Michigan
- North Carolina

Democrat – 232 + 90 = 322

Republican – 159 + 57 = 216



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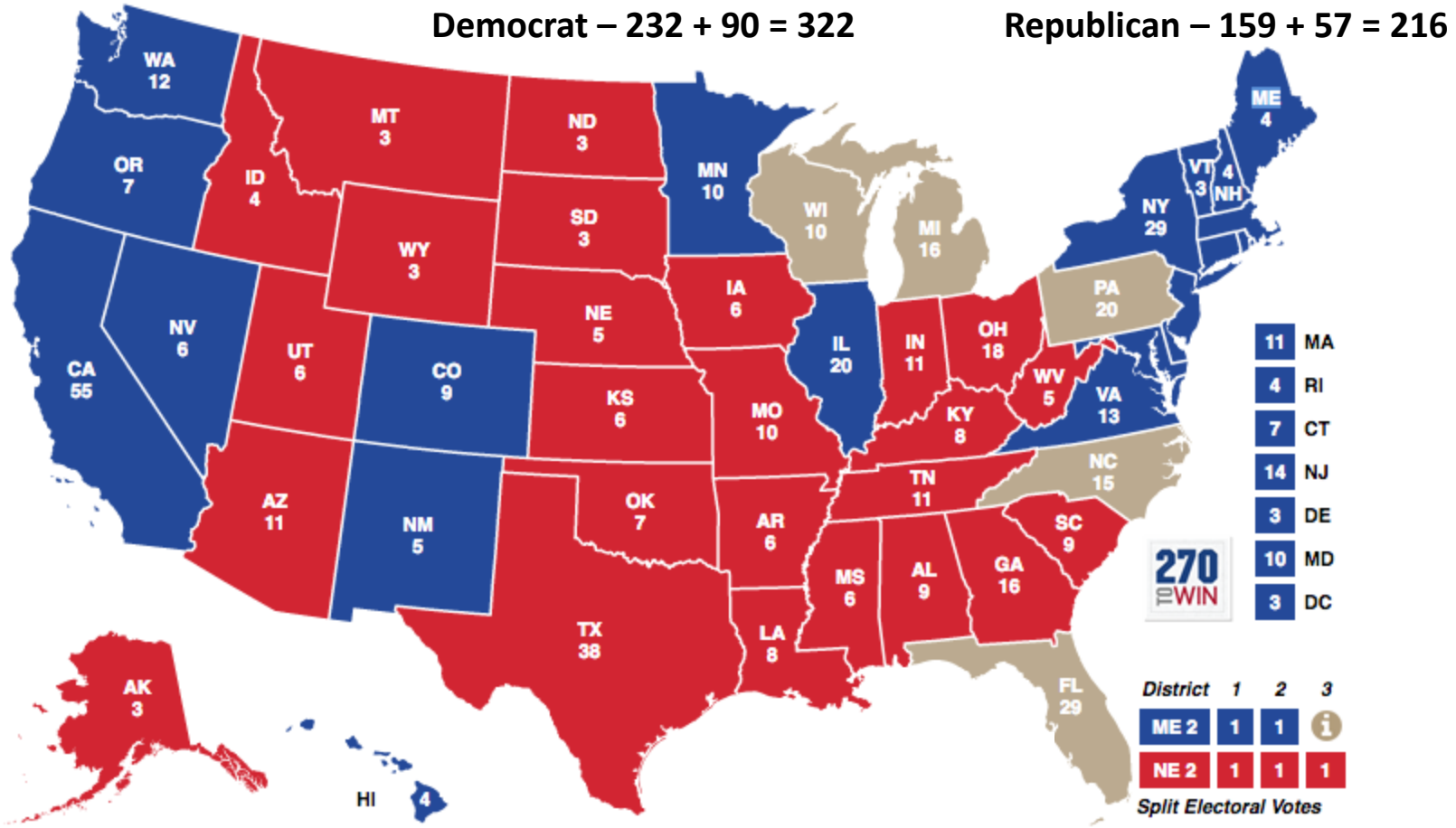
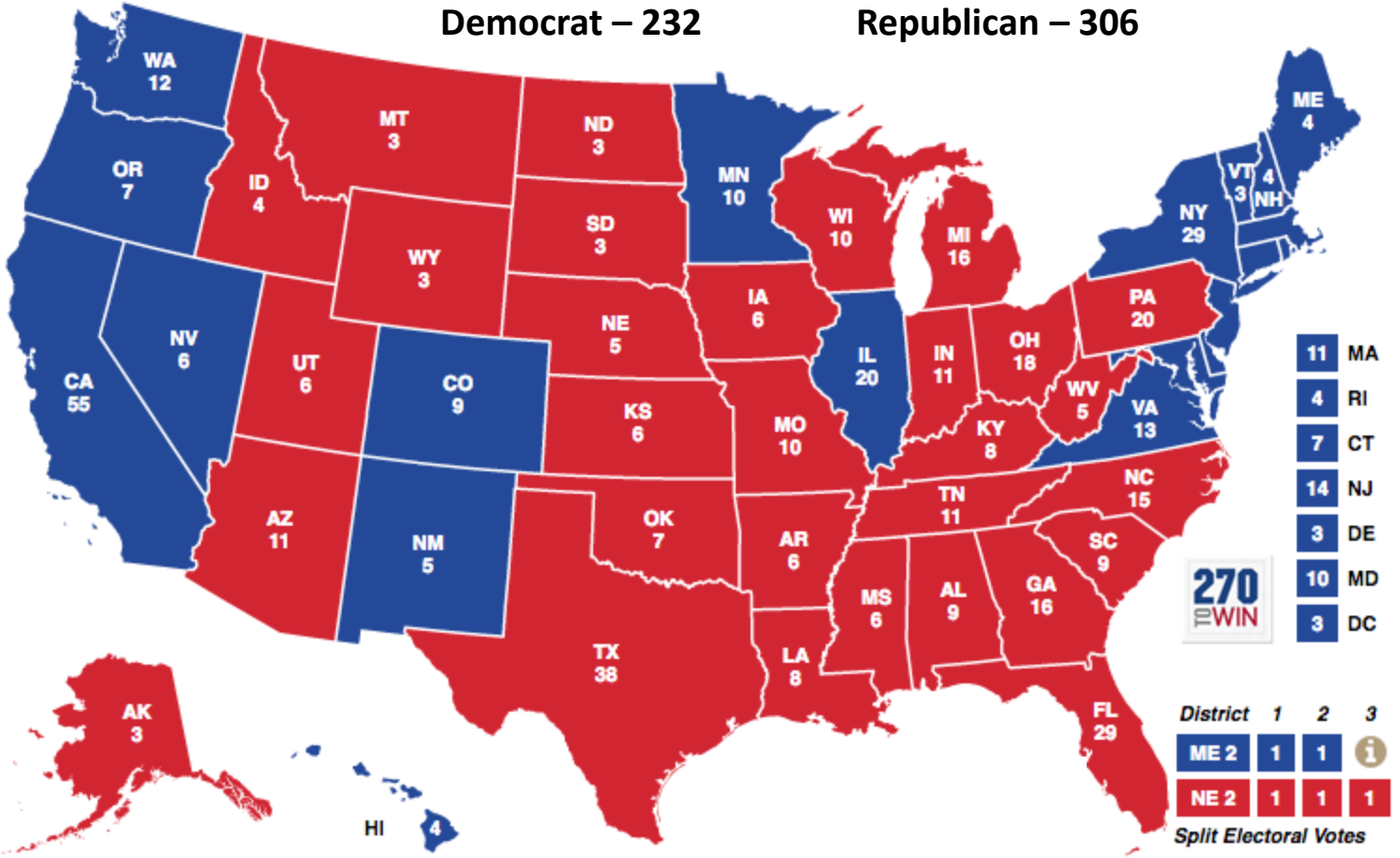


Democrat – 232 **Republican – 306**

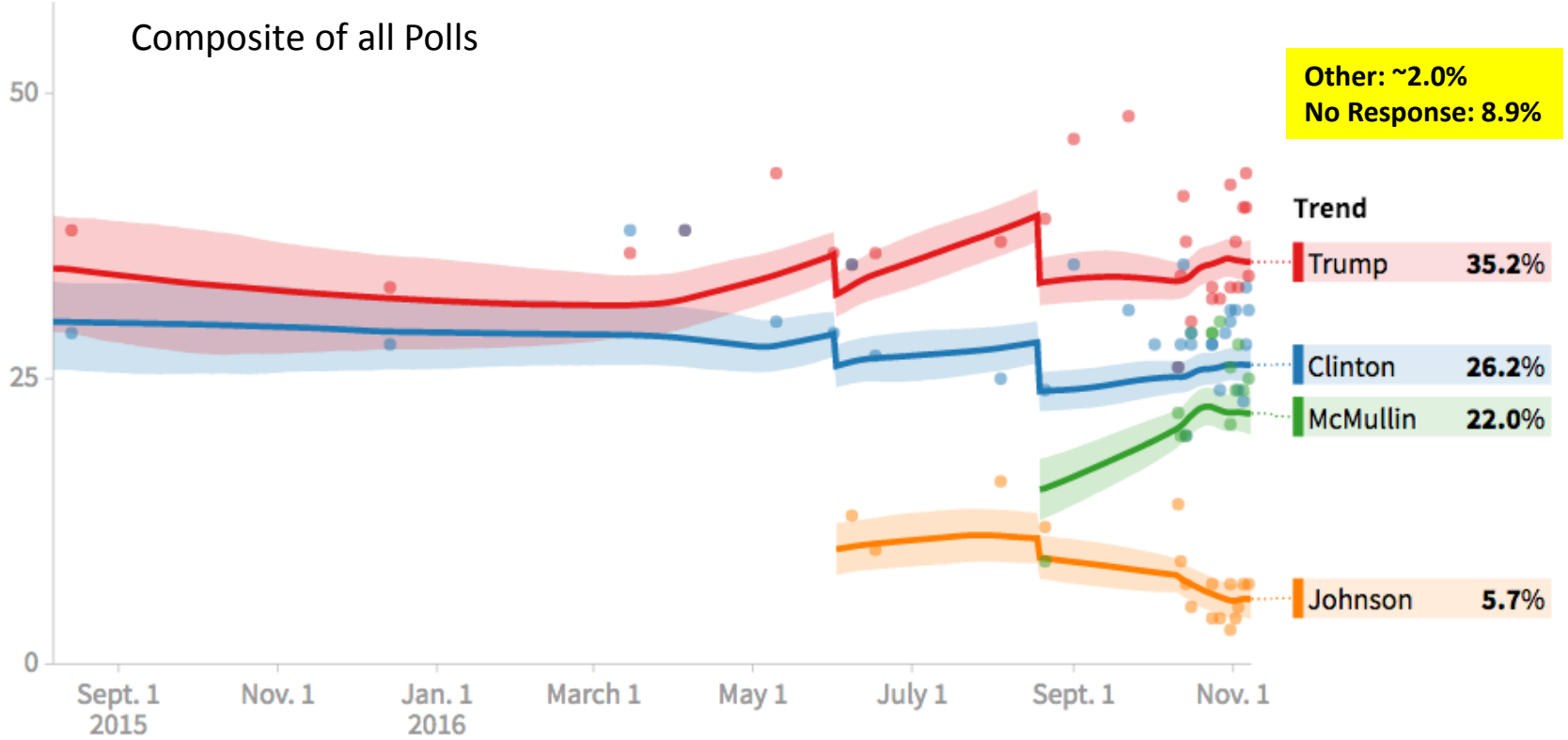


How did everyone get it so wrong?

- Polling (Urban/Rural, Non-college Whites)
- Demographic Diversity (Over-Represented)
- “Non-Response” to polls among Trump voters

“An Evaluation of 2016 Election Polls in the U.S.,” May 2017, Pew, SurveyMonkey, The Washington Post, Gallup, et.al., http://www.aapor.org/Education-Resources/Reports/An-Evaluation-of-2016-Election-Polls-in-the-U-S.aspx

Utah 2016 Presidential Election Polls



Utah 2016 Presidential Election Results

General election results, November 8, 2016			
Party	Candidate	Votes	%
Republican	Donald Trump	515,231	45.54%
Democrat	Hillary Clinton	310,676	27.46%
Independent	Evan McMullin	243,690	21.54%
Libertarian	Gary Johnson	39,608	3.50%
Green	Jill Stein	9,438	0.83%
Constitution	Darrell Castle	8,032	0.71%
	Others	4,755	0.42%
	Total votes	1,131,430	100.00%

Utah 2016 Presidential Election Results

General election results, November 8, 2016				Polls
Party	Candidate	Votes	%	%
Republican	Donald Trump	515,231	45.54%	35.20%
Democrat	Hillary Clinton	310,676	27.46%	26.20%
Independent	Evan McMullin	243,690	21.54%	22.00%
Libertarian	Gary Johnson	39,608	3.50%	5.70%
Green	Jill Stein	9,438	0.83%	2.00%
Constitution	Darrel Castle	8,032	0.71%	
	Others	4,755	0.42%	
	No Reponse			8.90%
	Total Votes	1,131,430	100.00%	100.00%

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How did everyone get it so wrong?

- Polling (Urban/Rural, Non-college Whites)
- Demographic Diversity (Over-Represented)
- "Non-Response" to polls among Trump voters
- Late FBI announcement of new review of Clinton "handling of sensitive information"
- Ultimate Turnout

"An Evaluation of 2016 Election Polls in the U.S.," May 2017, Pew, SurveyMonkey, The Washington Post, Gallup, et.al.,
http://www.aapor.org/Education-Resources/Reports/An-Evaluation-of-2016-Election-Polls-in-the-U-S.aspx

How did everyone get it so wrong?

- Polling (Urban/Rural, Non-college Whites)
  - Data Gathering (Sampling Errors)

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  - Analytical Errors (based on invalid assumptions)

How did everyone get it so wrong?

- Polling (Urban/Rural, Non-college Whites)
- Demographic Diversity (Over-Represented)
- “Non-Response” to polls among Trump voters
  - Anxiety (fear) to disclose information
  - Lack of data (truly had not made up their minds)
  - Assumption that “non-responses” mirror other results

How did everyone get it so wrong?

- Polling (Urban/Rural, Non-college Whites)
- Demographic Diversity (Over-Represented)
- “Non-Response” to polls among Trump voters
- Late FBI announcement of new review
  - Ignoring or undervaluing new data

How did everyone get it so wrong?

- Polling (Urban/Rural, Non-college Whites)
- Demographic Diversity (Over-Represented)
- “Non-Response” to polls among Trump voters
- Late FBI announcement of new review
- Ultimate Turnout
  - Introducing overconfidence and other biases

How did everyone get it so wrong?

- Data gathering (sampling) errors
- Analytical errors (based on invalid assumptions)
- Anxiety to disclose data, fear, information not available, assumption that “non-responses” mirror other results
- Ignoring or undervaluing new data
- Overconfidence, bias, and other poor assumptions

Do we sometimes get it wrong?

Managers need relevant data to inform strategic decisions that lead to desired outcomes. However, managers often don’t have the information they need and/or may be overwhelmed by the prevalence of “facts.”

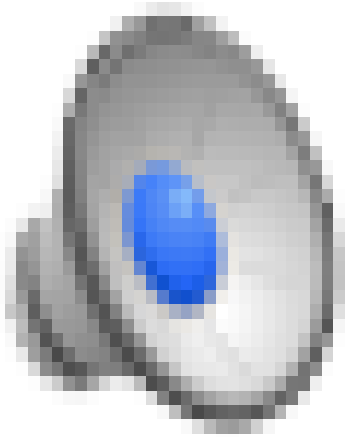
The remaining discussion offers a practical set of tools for establishing a measurement approach that helps drive improvements, including distinguishing a hierarchy of measures and considerations for "audit-proofing" reported data. Knowing what to watch will help avoid data “fake news.”

State of Utah “Systems Approach”

Utah State Government uses a “systems approach” to management and continuous improvement.

Agency administrators and managers work with GOMB to define their system, identify the critical activity, and apply the tools of the SUCCESS Framework to improve system-wide performance.

State of Utah “Systems Approach”



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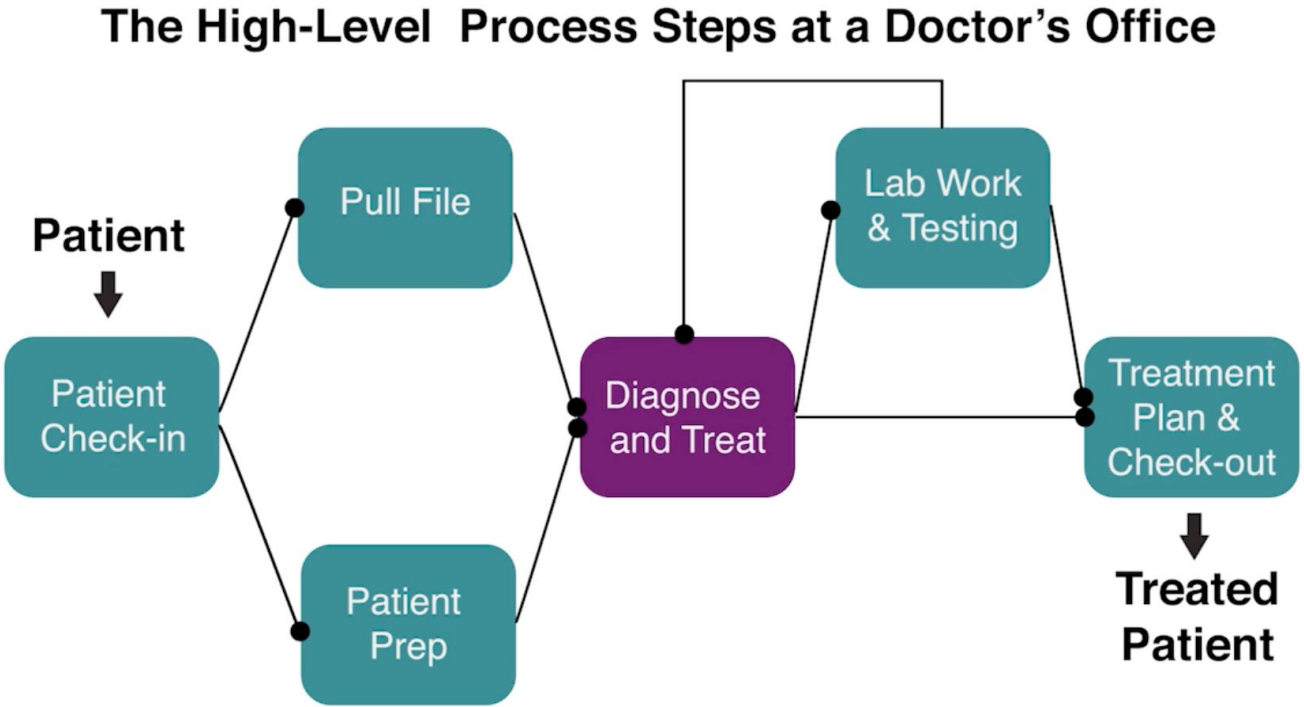
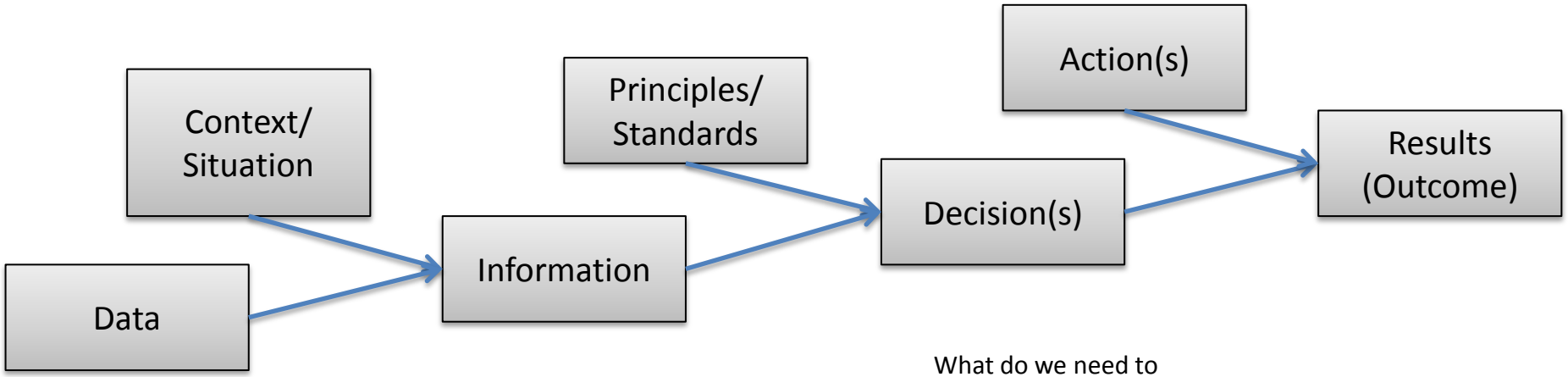
State of Utah “Systems Approach”



Relationship between data and results

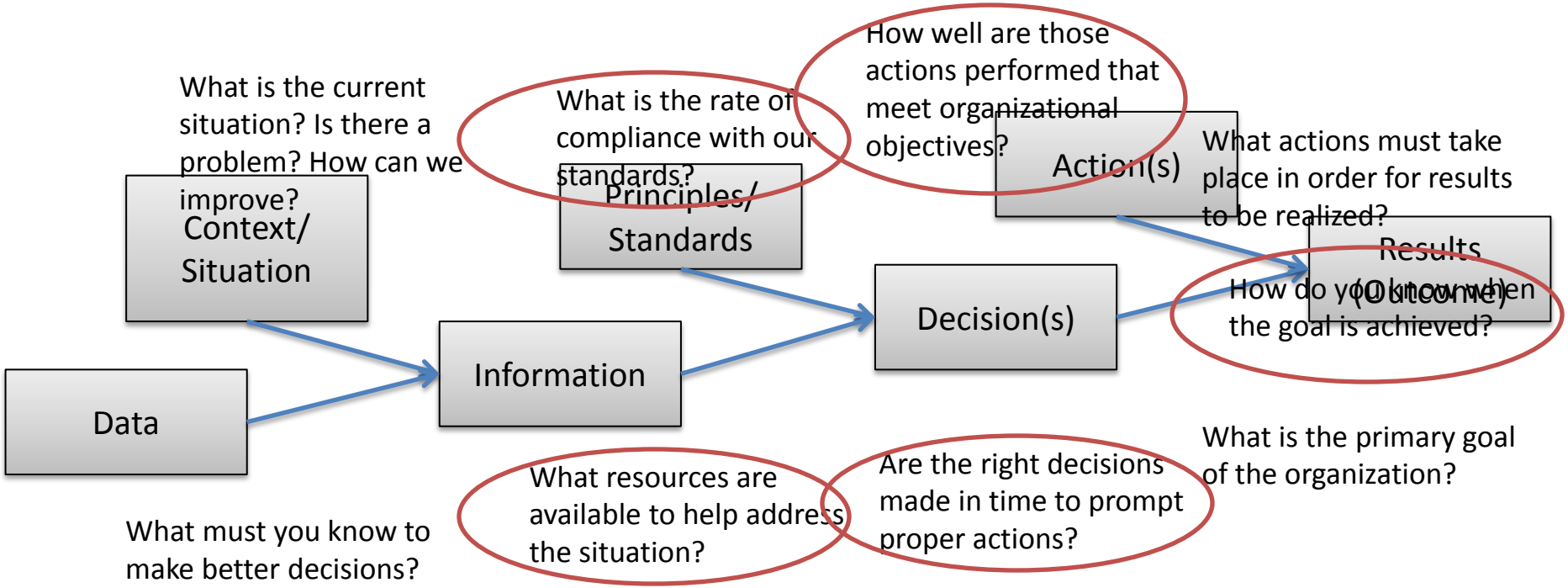


What are the questions we want to answer?
What do we need to know to make better decisions

Information provides the answers to the questions

What do we need to do differently?

Measures address questions at many points



Hierarchy of Measures

Strategic

Operational

Hierarchy of Measures

System Measures:

- Measures “goal units”
  - What we do (Throughput)
  - How well we do it (Quality)
  - For the best possible price (Operating Expenses)

Government examples include the number of quality units per dollar and costs per unit

Hierarchy of Measures

Process Measures:

- Help measure and manage the flow of work on a tactical level
- Provide fast feedback on improvement strategies
- Are monitored frequently

Examples include backlogs, compliance rates, work in process, cycle (touch) times, elapsed times, rework, etc.

Hierarchy of Measures

Status measures:

- Provide a quick, point in time “snapshot of facts”
- Content of most dashboards are heavy on status measures
- Status measures are necessary but insufficient -- they don’t focus on the entire system or help manage the flow of work

Examples are volume counts, people served, activities provided, types of services, errors made, etc.

Example: Baseball Measures

Derek Jeter

Standard Batting | More Stats | Glossary · Show Minors · SHARE · Embed · CSV · PRE · LINK · ?

Minors | Game Logs ▾ | Splits ▾ | HR Log | vs. Pitcher | Finders ▾

Year	Age	Tm	Lg	G	PA	AB	R	H	2B	3B	HR	RBI	SB	CS	BB	SO	BA	OBP	SLG	OPS	OPS+	TB	GDP	HBP	SH	SF	IBB	Pos	Awards
1995	21	NYY	AL	15	51	48	5	12	4	1	0	7	0	0	3	11	.250	.294	.375	.669	74	18	0	0	0	0	0	6	
1996	22	NYY	AL	157	654	582	104	183	25	6	10	78	14	7	48	102	.314	.370	.430	.800	101	250	13	9	6	9	1	*6	RoY-1
1997	23	NYY	AL	159	***748***	654	116	190	31	7	10	70	23	12	74	125	.291	.370	.405	.775	103	265	14	10	8	2	0	*6	MVP-24
1998	24	NYY	AL	149	694	626	**127**	203	25	8	19	84	30	6	57	119	.324	.384	.481	.864	127	301	13	5	3	3	1	*6	AS,MVP-3
1999	25	NYY	AL	158	**739**	627	134	***219***	37	9	24	102	19	8	91	116	.349	.438	.552	.989	15	3	12	12	3	6	5	*6	AS,MVP-6
2000	26	NYY	AL	148	679	593	119	201	31	4	15	73	22	4	68	99	.339	.416	.481	.896	128	285	14	12	3	3	4	*6	AS,MVP-10
2001	27	NYY	AL	150	686	614	110	191	35	3	21	74	27	3	56	99	.311	.377	.480	.857	124	295	13	10	5	1	3	*6	AS,MVP-10
2002	28	NYY	AL	157	730	644	124	191	26	0	18	75	32	3	11	97	.297	.373	.421	.794	111	271	14	7	3	3	2	*6/D	AS
2003	29	NYY	AL	119	542	482	87	156	25	3	10	52	5	4	1	324	39	.450	.844	125	217	10	13	3	1	2	*6	MVP-21	
2004	30	NYY	AL	154	721	643	111	188	44	1	23	78	2	46	92	.352	.471	.823	114	303	19	14	16	2	1	*6	AS,MVP-13,GG		
2005	31	NYY	AL	159	***752***	654	122	202	25	5	19	70	14	5	77	117	.309	.389	.450	.839	125	294	15	11	7	3	3	*6/D	MVP-10,GG
2006	32	NYY	AL	154	715	623	118	214	39	3	14	9	34	5	69	102	.343	.417	.483	.900	132	301	13	12	7	4	4	*6/D	AS,MVP-2,GG,SS
2007	33	NYY	AL	156	714	63	10	206	39	1	1	73	15	8	56	100	.322	.388	.452	.840	121	289	21	14	3	2	3	*6	AS,MVP-11,SS
2008	34	NYY	AL	150	6	596	8	9	3	11	69	11	5	52	85	.300	.363	.408	.771	102	243	24	9	7	4	0	*6/D	AS,SS	
2009	35	NYY	AL	153	716	4	10	212	27	1	18	66	30	5	72	90	.334	.406	.465	.871	125	295	18	5	4	1	4	*6/D	AS,MVP-3,GG,SS
2010	36	NYY	AL	157	**739**	3	111	179	30	3	10	67	18	5	63	106	.270	.340	.370	.710	90	245	22	9	1	3	4	*6/D	AS,GG
2011	37	NYY	AL	131	607	546	84	162	24	4	6	61	16	6	46	81	.297	.355	.388	.743	100	212	10	6	4	5	0	*6D	AS
2012	38	NYY	AL	159	***740***	***683***	99	***216***	32	0	15	58	9	4	45	90	.316	.362	.429	.791	115	293	24	5	6	1	1	*6D	AS,MVP-7,SS
2013	39	NYY	AL	1	4	4	1	1	0	0	0	1	0	0	0	0	.250	.250	.250	.500	39	1	0	0	0	0	0	/D	
19 Yrs				***2586***	***11899***	***10555***	**1869**	***3305***	**524**	**65**	**255**	**1255**	**348**	**95**	**1039**	**1743**	**.313**	**.382**	**.448**	**.829**	**117**	**4724**	**269**	**163**	**89**	**53**	**38**		
162 Game Avg.				162	745	661	117	207	33	4	16	79	22	6	65	109	.313	.382	.448	.829	117	296	17	10	6	3	2		
				G	PA	AB	R	H	2B	3B	HR	RBI	SB	CS	BB	SO	BA	OBP	SLG	OPS	OPS+	TB	GDP	HBP	SH	SF	IBB	Pos	Awards

Status Measures

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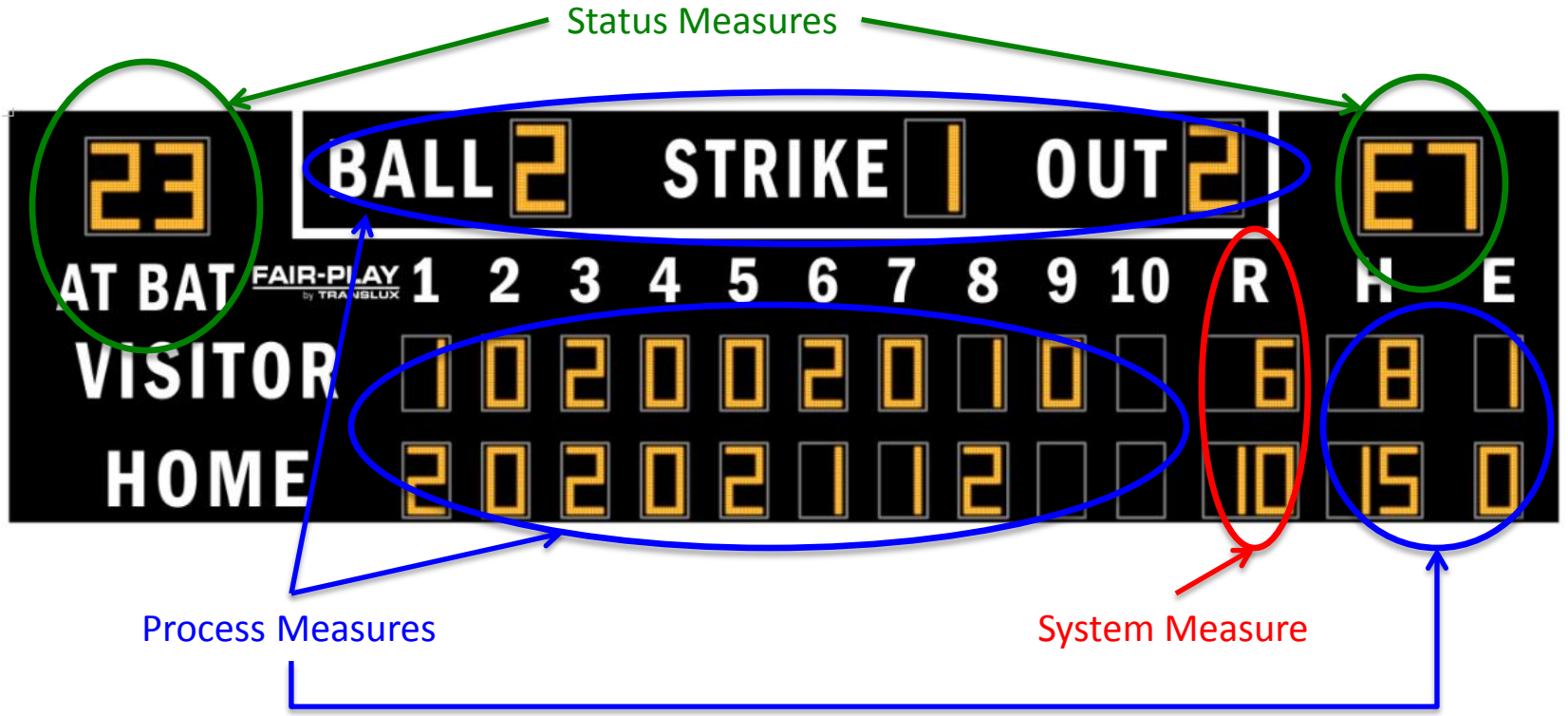
Example: Baseball Measures



Example: Utah Driver License Division

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Example: Utah Driver License Division

- What is the primary goal of the organization?
  - Promote public safety on Utah's roads* …
  - … by licensing and regulating driving privileges
- How do you know when the goal is achieved?
  - Safety on Utah's roads – Fewer deaths and crashes
  - Licensing – Effective and timely issuance and renewal of driver licenses

* There are three functions to promote public safety: regulation (Licensing), enforcement (UHP), and driver behavior (Highway Safety)

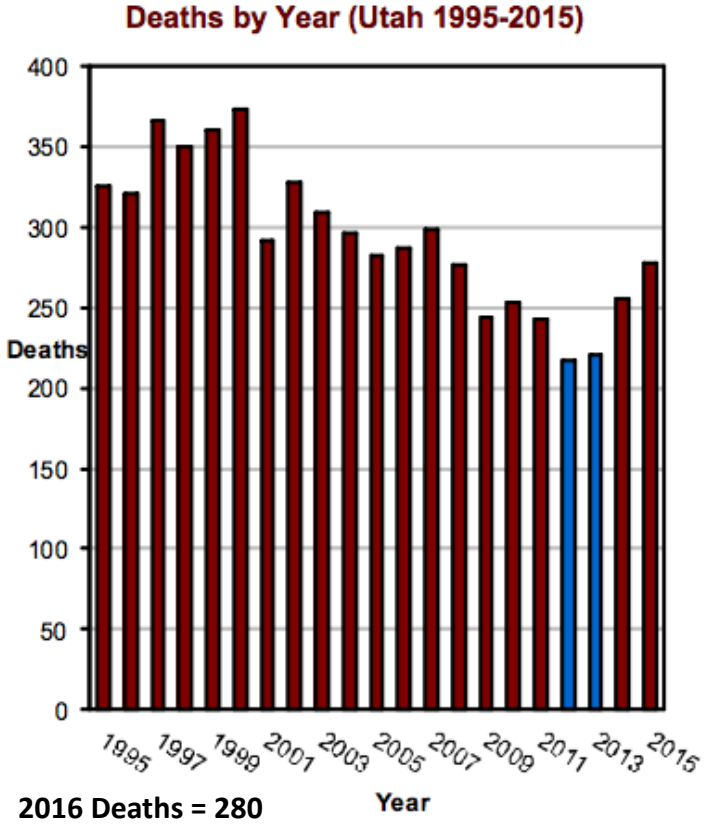
Example: Utah Driver License Division

- What actions must take place in order for results to be realized?
  - Process applications (issue/renew licenses and learner permits), verify instruction (basic youth driver, CDL training, motorcycle, taxi, etc.), administer examinations and road tests, verify identity, ensure financial responsibility (insurance), take photos, ensure “fit to drive” status (eye exam and examine medical history as needed), hearings for DUI (as needed), etc.
  - Review and analyze information about driver safety

Example: Utah Driver License Division

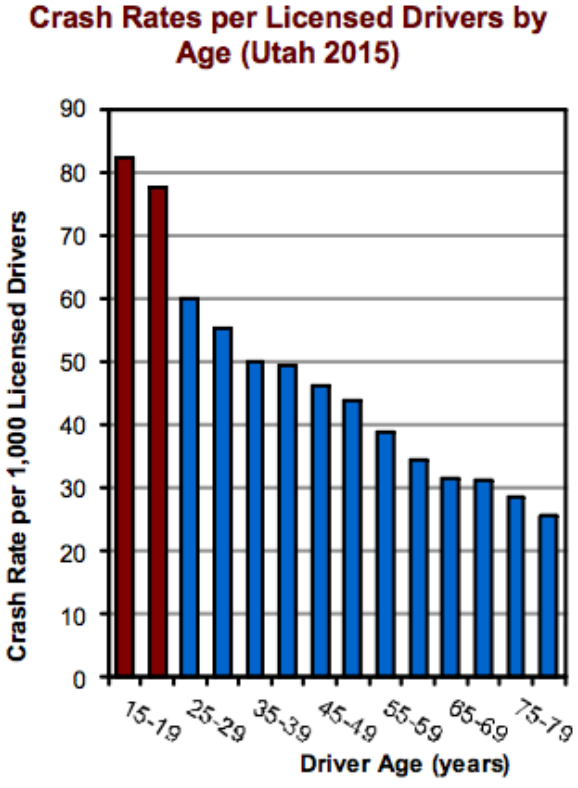
- How well are those actions performed that meet organizational objectives?
- What is the rate of compliance with our standards?
- 7am – 9am – less than 4 minutes waiting; 9am to noon – less than 6 minutes waiting; noon to 5pm – less than 8 minutes waiting; 5pm to 6pm – less than 3 minutes waiting
- Baseline (2014) was 54.94%

Example: Utah Driver License Division



2016 Deaths = 280

- 2012 (217) had the lowest deaths in Utah since1959 (205).



- Drivers aged 15-24 years had the highest crash rates per licensed driver.

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Example: Utah Driver License Division

- Status Measures

Crash Summary (Utah 2015)

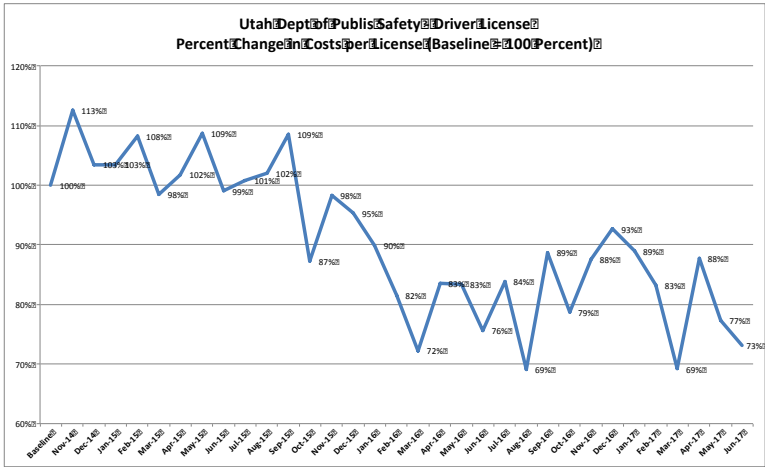
Leading Causes of All Crashes	Leading Causes of Death
1. Followed Too Closely (22%)	1. Speed (37%)
2. Failed to Yield (18%)	2. Unrestrained Occupants (31%)
3. Speed (18%)	3. Drunk Driving (13%)
4. Failed to Keep in Proper Lane (12%)	4. Failed to Yield (11%)
5. Distracted Driving (10%)	5. Failed to Keep in Proper Lane (11%)

These status measures help to inform the instruction and testing processes

If used as systems measures, these may result in poor strategic decisions (e.g., auto-governors/speed limiters and automatic seat belt restraints

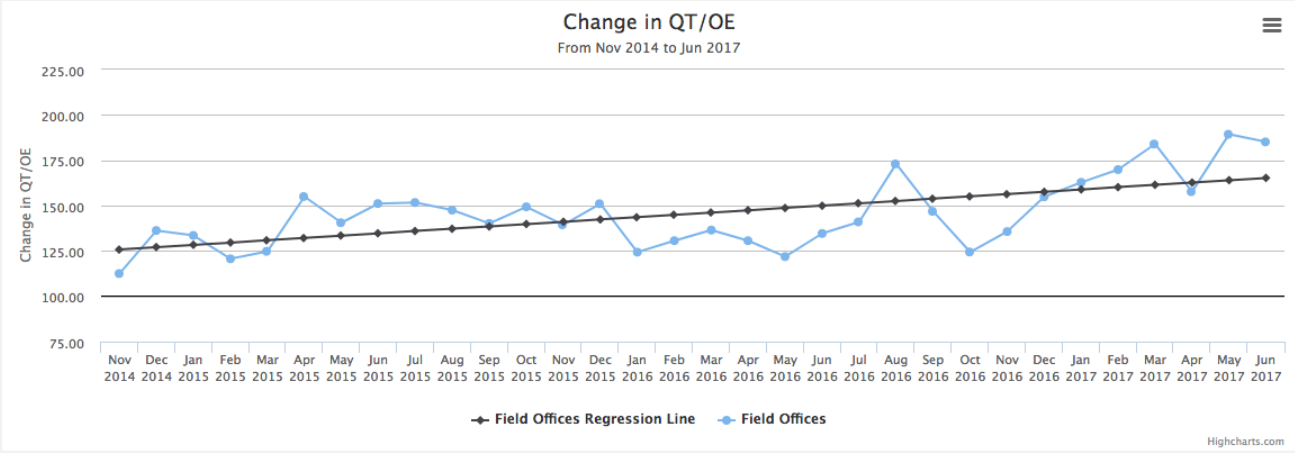
Example: Utah Driver License Division

- Process and System Measures
  - Compliance with Timeliness Standards – 74.32% (Jun 2017) (Process)
  - Change in costs per license – Down 27% (System and Process)
  - 2017 Zero Fatalities Report Card shows 20 fewer fatalities YTD (System)



Example: Utah Driver License Division

Driver License Division – Field Offices



180 - Dept of Public Safety / Driver License / Driver License / Field Offices

Interval	Report Date	Quality	Throughput	QT	OE	OE/T	QT/OE	Baseline Change	Index Change	Inactive
Baseline		54.94%	640,618	351,955.529	$9,198,112.51	14.358	0.038264	1	100	N
Monthly	06/28/2017	74.32%	76,897	57,149.85	$806,784.17	10.492	0.0708366035	1.85126	185.126	N

Combined trend in timely issuance, licenses issued, and cost containment

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Utah's slowest driver license division cuts down wait time

By Tori Jorgensen | Posted Oct 16th, 2015 @ 6:31pm

8 photos 9

WEST VALLEY CITY — Christine Espinel took the day off of work Thursday, expecting to spend hours at the Utah Driver License Division so her teenage son could get his learner permit.

Espinel was surprised when they were in and out in less than 20 minutes.

"This is absolutely crazy. I've never done this so fast. I've been a Utah driver my whole life and have had plenty of time sitting in one of those chairs," she said, motioning to the waiting area.

Mother and son didn't spend any time sitting. Instead, they walked straight from filling out forms to the information booth, then to a work station.

The experience is not unique to the Espinels.

Since December, the Utah Department of Public Safety has significantly cut down on the wait time for customers, said Nannette Rolfe, deputy commissioner at the department.

The Driver License Field Office in West Valley City, previously the slowest license-issuer in the state, reduced its average wait time to between four and nine minutes.

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Audit-Proofing your Measures

- An audit is an independent evaluation of the program, system, process, or project.
  - Audits are performed to ascertain the validity and reliability of information
  - And to provide an assessment of a system's internal control(s)

Audit-Proofing your Measures

- Reliability in methodologies and practices

  Ensure that the same results are calculated every time measures are generated from the same source data; written procedures, verifiable sources (FINET and other financial or transactional data systems)

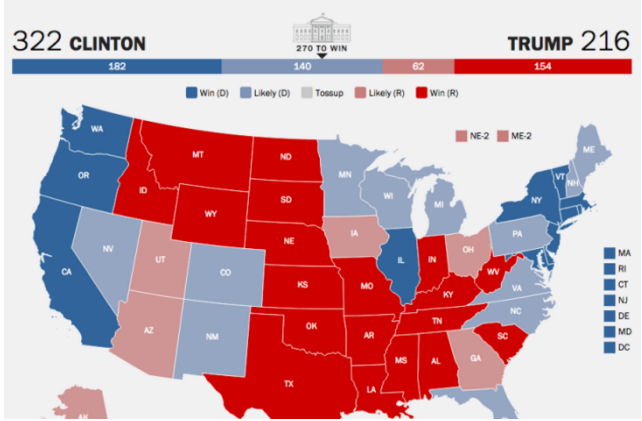
- Internal Controls
  - Mechanisms to prevent or detect errors (e.g., computer edits)
  - Periodic reviews for accuracy/reasonableness
  - Trained and independent staff

- Keeping Records

  Over time, source records may be updated and change historical results when regenerated; therefore, it's a good practice to retain a copy (file) of measures as they were when originally reported

Summary

- Avoid Data Fake News
  - Data gathering (sampling) errors
  - Analytical errors (based on invalid assumptions)
  - Anxiety to disclose data, fear, information not available, assumption that “non-responses” mirror other results
  - Ignoring or undervaluing new data
  - Overconfidence, bias, and other poor assumptions



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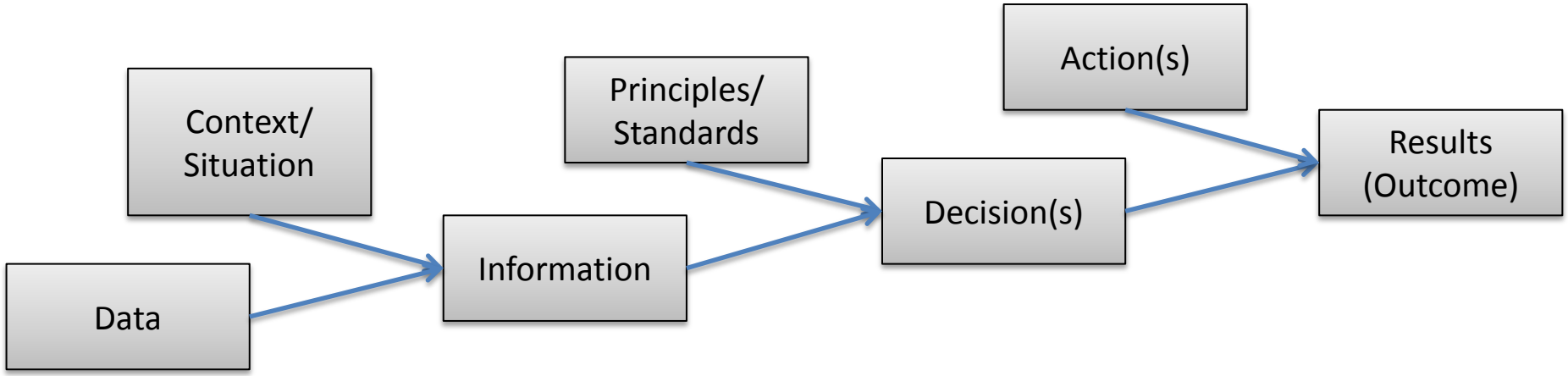
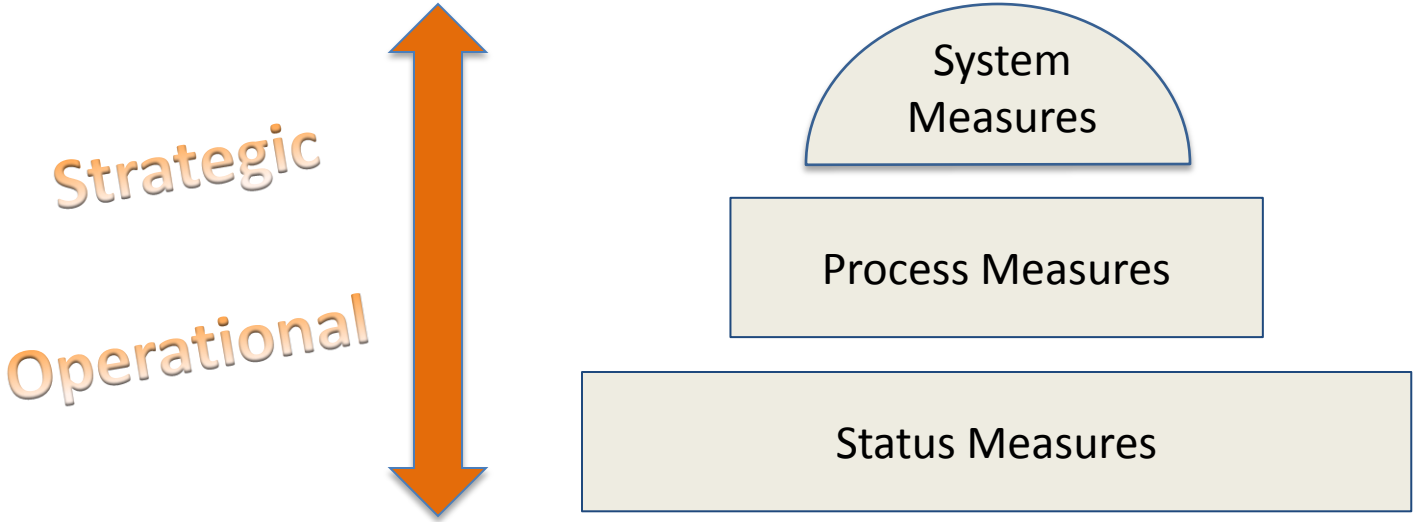
Summary

Recognize the relationship between data and results



Summary

Consider the hierarchy of measures



Summary

- Audit-proof your measures
  - Reliability in methodologies and practices
  - Internal Controls
  - Keeping Records

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